



PRiMO Highlights

Pacific Island Tsunami Inundation Modeling

Background

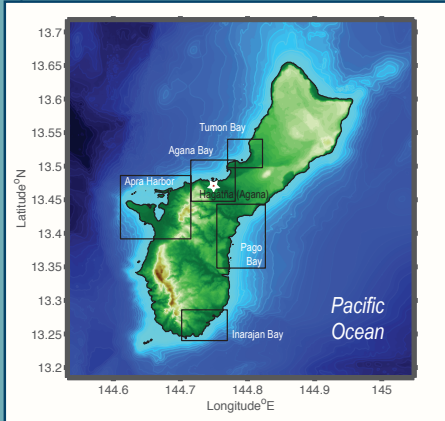
Following the 2004 Indian Ocean Tsunami, members of the Pacific Risk Management 'Ohana (PRiMO) responded to the need for tsunami risk assessments for Pacific Islands. This collaboration has resulted in the first comprehensive tsunami risk assessment for Guam. This assessment includes new information on potential tsunami wave heights, travel times, and inundation. This information is vital for government agencies to develop comprehensive tsunami preparedness, response, and recovery strategies. Through this partnership, hazard risk assessments will also be completed for the Commonwealth of the Northern Mariana Islands (CNMI) and American Samoa.

Inundation and Wave Heights Results

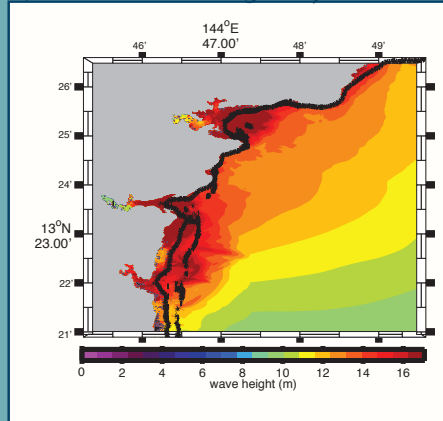
A risk assessment was conducted for the following five sites; Apra Harbor, Tumon Bay, Pago Bay, Agana Bay and Inarajan Bay. Results indicate that tsunamigenic earthquakes (earthquakes that result in tsunamis) from the Marianas and Philippine Trenches could result in a large tsunami reaching Guam. The worst-case scenario model results (9.0 magnitude) below, show the extent of inundation and maximum wave heights at each of the five assessment sites.

The red colors represent the highest wave heights, while purples and blue represent smaller waves. The model used to create this figure was verified by comparing model results to actual wave heights recorded at Apra Harbor from three historical tsunamis (1952 Kamchatka, 1964 Alaska and the 1960 Chile earthquakes).

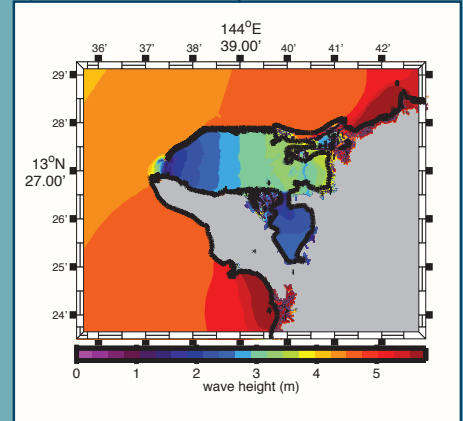
a) Guam Assessment Sites



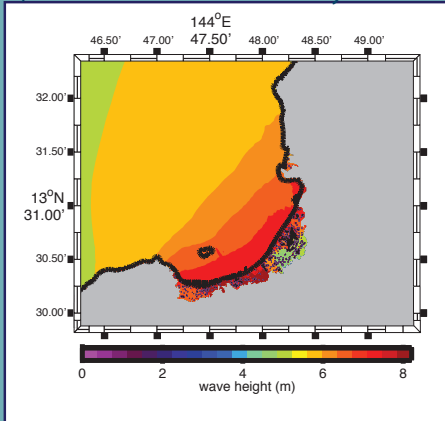
b) Inundation at Pago Bay



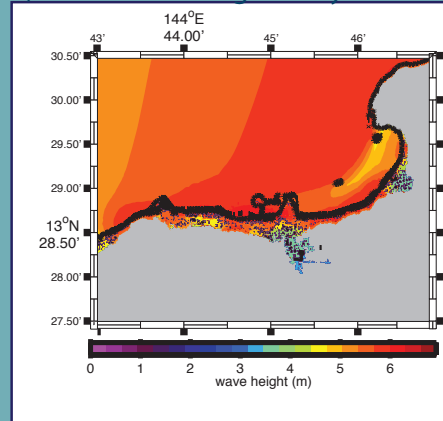
c) Inundation at Apra Harbor



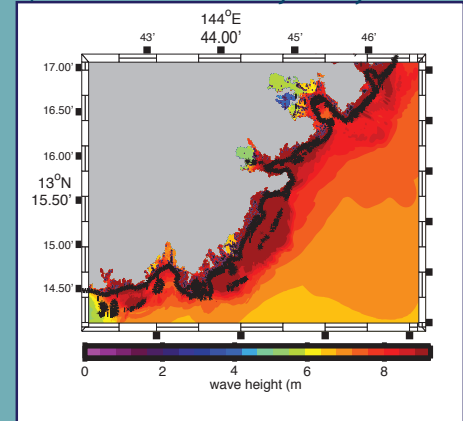
d) Inundation at Tumon Bay

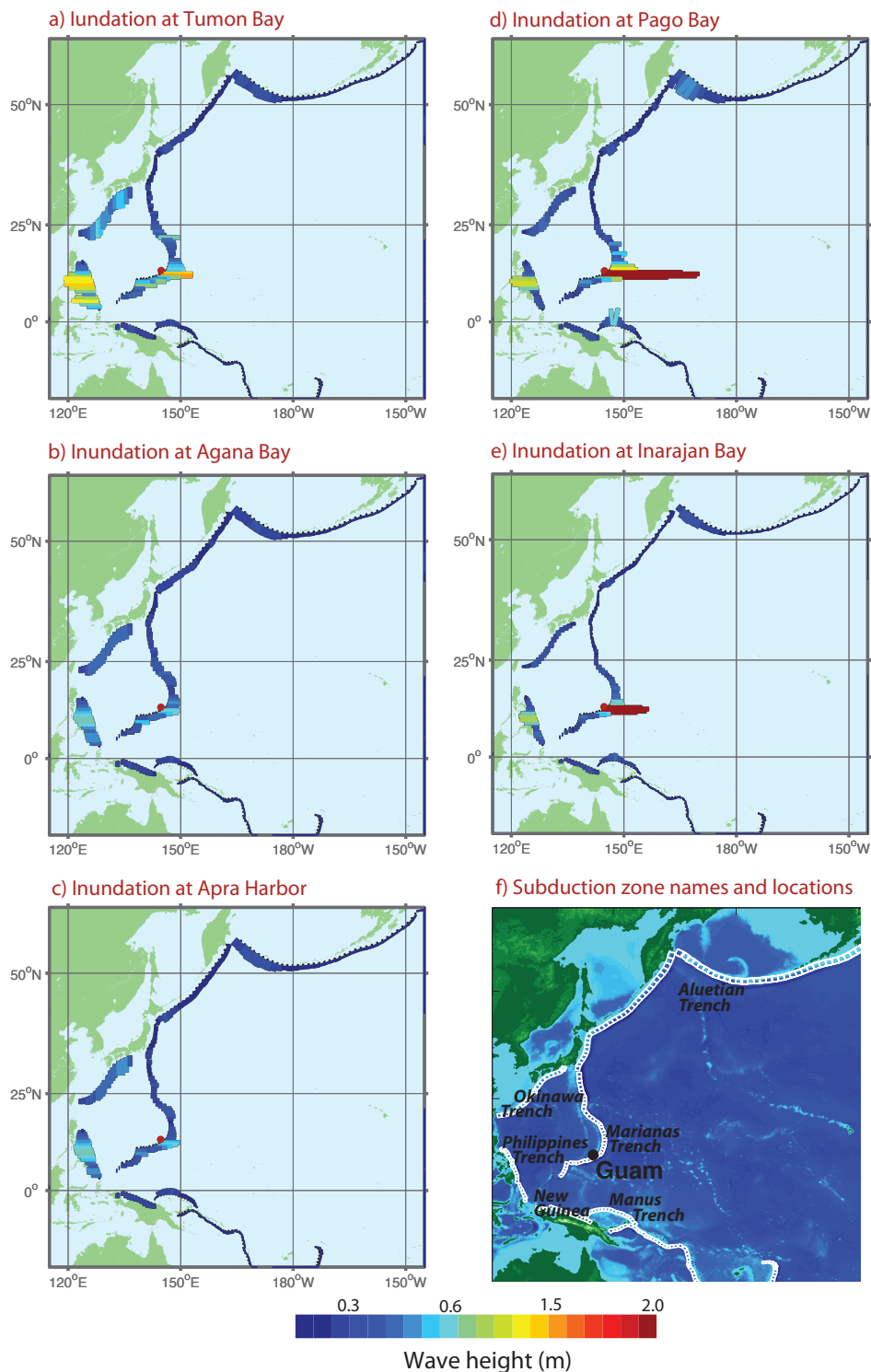


e) Inundation at Agana Bay



f) Inundation at Inarajan Bay





This study was completed in partnership with the following National Oceanic and Atmospheric Administration (NOAA) programs.

Pacific Services Center <http://www.csc.noaa.gov/psc/>

National Weather Service <http://www.nws.noaa.gov/>

Pacific Marine Environmental Laboratory (PMEL) www.pmel.noaa.gov/

Center for Tsunami Research (NCTR) <http://nctr.pmel.noaa.gov>

Wave heights

Computed wave heights from multiple earthquake sources for each of the five sites are shown here (figures a - e). The color bars represents the variability in the wave heights of tsunamis generated from different earthquake locations across the region. For example, the largest wave heights come from the Marianas Trench, and affect Pago and Inarajan Bay greatly. On the other hand, Tumon Bay, Agana Bay, and Apra Harbor are most at risk from the Okinawa, Philippine, and New Guinea Trenches.

Travel Times

The amount of time between an earthquake and the first tsunami wave is vital to developing evacuation plans. The warning time, or tsunami travel time, for Guam depends greatly on the source location of the earthquake. Map f) shows earthquake source locations throughout the West Pacific. The table below shows the estimated time before a tsunami will arrive at Guam for six different regions. Tsunamis from the Aleutian Trench provide the most warning time for Guam, with over 6 hours. Tsunamis from the Philippine, Okinawa, Manus and New Guinea Trench will arrive in Guam in just over 2 hours. The tsunami with the least warning time originates from the Marianas Trench. Tsunami travel and warning time will vary from one beach to another.

Estimated Tsunami Travel Times	
Marianas Trench	<10 minutes
Philippines Trench	2 hours 36 minutes
Okinawa Trench	2 hours 50 minutes
Manus Trench	2 hours 15 minutes
New Guinea Trench	2 hours 30 minutes
Aleutians Trench	6 hours 11 minutes